

CLAIMS

What is claimed is:

1. An audio DVD-CD device, comprising:
 - a playback system for playing audio from both CD and DVD discs;
 - a data manager located within said playback system; and
 - a user-accessible button panel and an on screen display both electronically connected to said playback system, for duplicating the functionality of a DVD selection panel so as to enable a user to make selections that appear on the screen even though no video portion of the DVD is displayed.
2. The device of claim 1, wherein said playback system further comprises:
 - a data bus;
 - a disc motor for rotating the disc, responsive to signals sent along the bus,
 - an optical pickup (OPU) subsystem, for obtaining data from the disc; and
 - a signal amplifier, servo error detector, servo control subsystem, and a plurality of servo drivers, all connected to the disc motor.
3. The device of claim 2, wherein the disc motor includes a collection of spindle motors which rotate the disc to a variety of desired speeds depending on whether a CD or DVD is being operated, various user selections, and internal resistance factors.
4. The device of claim 3, wherein the servo drivers output signals to the disc motor to drive and control the rate of rotations of the various motors contained in

disc motor, where the servo drivers also output signals to position the OPU on the desired location of the disc to focus the laser beam onto disc and to track the recorded spiral pits on disc;

and further wherein the bus has an arbitrator and devices connected thereto make bus access requests of the arbitrator prior to obtaining access, where each access request is typically processed according to a priority scheme, which is typically based on the priority given to a specific device and the order in which the bus access requests are received;

5. The device of claim 4, wherein the priority scheme is set up so that no device monopolizes the bus, thereby avoiding the starving of the other devices;

and further wherein the arbitrator has a queuing module designed to share the bus so that no device attached therein can use more than approximately 40% of the bus's total available bandwidth.

6. The device of claim 5, wherein the various components of the playback system can be located on one integrated circuit die, but also can be separate non-integrated components in any combination;

wherein the playback system can accept data from pre-fabricated CD/DVD modules that already have all the logic for sensing data from the disc lenses, motors, and optical devices, so that the OPU, motor, error detector, and control subsystem are unused and instead the above connected directly to the pre-fabricated disc sensing mechanisms;

7. The device of claim 6, wherein the data manager is optimized to separate and process audio information read from a disc by receiving inputs from signal amplifier and servo error control signals from the servo error detector;

and further wherein the data manager performs servo operations, bit clock and data extraction, conversion of analog input signals to digital signals, sync detection and demodulation of CD and DVD data, error detection and correction of CD and DVD data, de-scrambling of DVD data, and links directly to the bus.

8. The device of claim 7, wherein the data manager further comprises:

a read channel subsystem;

a CD digital signal processor and an associated memory;

a DVD digital signal processor (DSP) and an associated memory;

a block decoder along with an associated memory, connected to both signal processors;

an Advanced Technology Attachment Packet Interface (ATAPI) interface; and

a host system central processing unit (CPU) connected to the ATAPI interface and the read channel subsystem;

wherein the read channel subsystem extracts bit clock and bit data information commonly associated with CDs and DVDs from the output of the signal amplifier and receives the equalized signal from signal amplifier and converts the analog signal to digital using baseline tracking techniques, where it then extracts clock and data information;

and further wherein the CD-DSP demodulates channel bits read from a CD into data bytes and performs error detection and correction on the data bytes, while

a memory coupled to the CD-DSP facilitates de-interleaving, error detection, and error correction operations, and the block decoder performs data block error correction on the CD data and converts the data blocks received from CD-DSP into CD blocks.

9. The device of claim 8, wherein the ATAPI interface facilitates the transfer of CD data blocks and DVD sector data to the host system CPU using the system bus, while the MPEG decoder decompresses and separates the compressed audio and video data where most of the decompressed video data is stripped off and discarded, although a minimal amount is interpreted potentially for displaying choices to a user where applicable;

and further wherein the CPU performs various housekeeping functions such as register configuration or initial setup of the playback system of the present invention by providing read and write capabilities for the various registers and memory locations, and also monitors the flow of data within the various components therein, and also assists in controlling the MPEG decoder.

10. The device of claim 9, wherein the ATAPI receives and parses the encoded multimedia bitstream from the block decoder, and the pre-parser determines the substream membership of each data packet from the packet header and routes the packet contents minus identifying fields from the packet header to the appropriate elementary bitstream buffer in memory where they wait on the availability of the associated module to begin being processed, while certain data packets are retrieved directly from the appropriate buffer in memory by the

associated module;

and further wherein data packets having variable-length encoded data such as compressed audio and video are passed to the post-parser which can parse the bitstream syntax and perform elementary operations such as extracting the bit allocation and scaling information from the headers as well as apply that information to convert the variable-length encoded data into fixed-length transform coefficients which are easier for subsequent modules to process;

11. The device of claim 7, wherein the data manager further comprises:

no ATAPI interface;

a read channel subsystem, a CD-DSP preprocessor and a DVD-DSP preprocessor coupled thereto;

a multiplexer for receiving signals from the CD-DSP preprocessor and DVD-DSP preprocessor;

an error code correction and detection (ECCD) subsystem,

an MPEG interface;

a single unified multi-port memory connected to all the above devices;

wherein the ECCD subsystem is responsible for performing error detection and correction for both CD and DVD data, and reads CD or DVD data written to the memory subsystem by a CD-DSP preprocessor or a DVD-DSP preprocessor, using non-sequential memory read operations which allow de-interleaving of the data that is read out, and performs error detection and correction on the data as defined by the Red Book standard for CD data and by standards published by the DVD consortium for DVD data, where the corrected data is written back to memory

subsystem.

12. The device of claim 11, wherein the memory subsystem provides memory resources for internal operations of the data manager and provides a common memory resource for processing performed by CD-DSP preprocessor, DVD-DSP preprocessor and ECCD subsystem, and provides memory resources for storing data processed by these preprocessors;

13. The device of claim 1, wherein a console display controller retrieves decoded non-stripped digital video data, decodes the information where possible, and communicates with the console display which shows system information, e.g. configuration menus, time, channel volume, language, and scene;

wherein a video processor separates bitmap signals from other non-video data modules and then interprets and displays them onto the console display, and retrieves bitstream information from the bus after being routed through the MPEG interface and the post-parser, decodes that data, and provides all displayable portions of the resulting decoded information to the console display;

14. The device of claim 13, wherein decision making data regarding advancing the DVD is sometimes available which can be parsed and interpreted for the console display controller;

wherein the video processor further comprises a memory is used to buffer, strip, and interpret the video information if possible;

and further wherein a 'φ' symbol or warning beep or noise is displayed if the

user makes an illogical choice.

15. The device of claim 13, wherein the audio processor receives audio data from the post-parser through the bus, and is configurable to parse the audio bitstream side information from data header fields and to convert transform coefficients into digital audio samples, and is further configurable to re-assemble LPCM audio data into digital audio samples;

wherein the audio processor may be configured to retrieve audio data directly from the elementary audio bitstream buffer from the post-parser with the permission of the bus arbitrator, or may also be configured to receive audio data directly from the MPEG decoder where it tracks the location of the next byte to be retrieved using an audio bypass buffer pointer, and maintains a loose synchronization with the MPEG decoder to avoid introducing any undesired delays between reproduced audio signals.